REMARKS

Upon entry of this amendment, claims 1-10, 12-22, 24, 25, and 33-45 are pending in the application; of which claims 1, 10, 17, 21, 33, 38, 41 and 44 are being amended.

The claim amendments are supported by the Specification, original claims, and Drawings as originally filed. Thus, no new matter is added, and entry of the amendments is respectfully requested.

Reconsideration of the present application is respectfully requested in view of the amendments and arguments made herein.

Rejection Under 35 U.S.C. 102(b)

The Examiner rejected claims 1-10, 12-22, 24, 25, and 33-45 under 35 U.S.C. 102(b) as being anticipated by Japanese Published Unexamined (Kokai) Patent Publiction No. 58-33836 (hereinafter, Koizumi).

Koizumi does not teach independent claims 1, 10, 17, 21, 33, 38, 41 and 44, as amended, which recite detection of optical radiation and monitoring the depth of a layer being processed on the substrate by evaluating the detected optical radiation. Instead Koizumi teaches:

> "The intensity of light emitting spectra of plasma is detected. Based on the detected value, the flow volume of reaction gas, the pressure thereof and the power supply are controlled to control the plasma energy inside the asher device constantly at a specific level. By these means, a sufficient scum removal is performed to improve the yield in the production of a semiconductor device." (Koizumi translation, first full paragraph)

Thus, Koizumi teaches detecting the intensity of a light emitting spectra of plasma to control plasma energy in the chamber.

Koizumi further teaches that the detected light emitting plasma spectra is: "...compared with a predetermined reference value, [and] the size of the plasma energy is identified in the plasma energy at the time is larger or smaller than a predetermined energy. Accordingly, control the unit 13 operates as to control the plasma energy in a smaller or larger direction based on the aforementioned difference." (Koizumi translation, page 5, first paragraph.)

Thus, Koizumi uses detected light emitting plasma spectra to control the plasma energy in a smaller or larger direction based on the difference between the measured spectra and a predetermined reference spectra.

Therefore, Koizumi does not teach the step of evaluating the detected optical radiation to monitor the depth of a layer being processed on the substrate as claimed in the amended claims. Nor does Koizumi teach determining an endpoint of the process from the detected optical radiation as recited in claim 21.

Therefore, since Koizumi does not teach each and every element or step of the processes claimed in claims 1, 10, 17, 21, 33, 38, 41 and 44, Koizumi does not anticipate the present claims, or the claims dependent therefrom.

Rejection Under 35 U.S.C 103 (a)

The Examiner rejected claims 8, 9, 24 and 25 under 35 U.S.C. 103(a) as unpatentable over Koizumi in view of US Patent 5,807,761 issued to Coronel et al.

Koizumi does not teach independent claims 1, 10, 17, 21, 38, 41 and 44, as amended, which recite detection of optical radiation and monitoring the depth of a layer being processed on the substrate by evaluating the detected optical radiation to monitor a depth of a layer being processed on the substrate. Instead Koizumi teaches detecting the intensity of light emitting spectra of plasma to control the plasma energy inside an asher device. Koizumi further teaches using the detected plasma spectra

measurements to control plasma energy by adjusting the flow volume of reaction gas, the pressure thereof and the power supply. Thus, Koizumi does not teach the step of evaluating the detected optical radiation to monitor the depth of a layer being processed on the substrate as claimed in the amended claims.

Coronel et al. does not make up for the deficiencies of Koizumi, because Cornell et al. does not teach energizing the gas by passing RF energy through a wall of the process chamber at a power sufficient to couple the RF energy from above an external surface of the process chamber to the gas inside the process chamber to energize the gas as claimed in claim 1. Instead, Coronel et al. teaches the "[t]he plasma is generated between the two electrodes..." which comprise the susceptor 23 and chamber wall. (Coronel col. 7, lines 24-29.) The two electrodes do not pass RF energy through a wall of the process chamber at a power sufficient to couple the RF energy from above an external surface of the process chamber to the gas inside the process chamber to energize the gas as claimed in claim 1.

The combination of Koizumi and Coronel et al. also does not teach or suggest passing RF energy through a wall of the process chamber at a power sufficient to couple the RF energy from above an external surface of the process chamber to the gas inside the process chamber to energize the gas, and detecting optical radiation thorough the wall and monitoring the depth of a layer being processed on the substrate by evaluating the detected optical radiation. Passing RF energy through a wall to energize a gas, while simultaneously detecting optical radiation passing through the same wall to monitor a depth of the layer, is counterintuitive, because the mechanism to generate and pass the RF energy through the wall may block the optical radiation, which also passes to the same wall to be measured. One would have to specially design the RF energy source so that it does not interfere with the passage of the optical radiation. Instead, it would be simpler and easier to monitor the optical radiation through a different wall than that through which the RF energy is passed. Thus, one of ordinary skill in the art would not be motivated to combine the teachings of the two references as suggested by the Examiner to render obvious claim 1 and the claims

dependent therefrom, absent some teaching that would suggest that such a combination is desirable.

The combination of Koizumi and Coronel et al. do not teach claim 10 or the claims dependent therefrom, because the references do not teach inductively coupling RF energy through a portion of the ceiling of the process chamber facing the substrate at a power sufficient to couple the RF energy from above an external surface of the portion of the ceiling facing the substrate to the gas inside the process chamber to energize the gas, detecting optical radiation from directly above the surface of the substrate after the radiation propagates through a window in the portion of the ceiling facing the substrate and the external surface of the process chamber, and evaluating the detected optical radiation to monitor the depth of a layer being processed on the substrate. Nor do the cited references provide the motivation for such a combination.

The combination of Koizumi and Coronel et al. also do not teach claim 17 or the claims dependent therefrom, because the references do not teach, inductively coupling RF energy at a power sufficient to pass the RF energy from above the at least partially domed external surface to the gas inside the chamber, monitoring optical radiation from directly above a surface of the substrate that propagates through the at least partially domed external surface during processing of the substrate, and evaluating the detected optical radiation to monitor the depth of a layer being processed on the substrate.

The combination of Koizumi and Coronel et al. further do not teach claim 21 or the claims dependent therefrom, because the references do not teach powering an antenna to inductively couple RF energy at a power sufficient to pass RF energy from outside an external surface of a portion of the ceiling of the first enclosure facing the substrate to the process gas inside the first enclosure to energize the process gas, and monitoring a sufficient intensity of optical radiation from directly above the surface of the substrate from after the radiation has propagated through the portion of the ceiling and external surface of the first enclosure facing the substrate and into a second

enclosure disposed above the first enclosure to monitor the depth of a layer being processed on the substrate to determine a process endpoint.

The combination of Koizumi and Coronel et al. also do not teach claim 33 or the claims dependent therefrom, because the references do not teach powering the non-vertical antenna that is to couple energy through the wall to the gas inside the process chamber to energize the gas, detecting optical radiation propagating through the wall, and evaluating the detected optical radiation to monitor the depth of a layer being processed on the substrate, as claimed.

The combination of Koizumi and Coronel et al. also do not teach claim 38 or the claims dependent therefrom because the references do not teach coupling energy across a substantial portion of the external top surface to the gas in the chamber by powering the antenna, monitoring optical radiation that propagates through the portion of the external top surface, and evaluating the detected optical radiation to monitor the depth of a layer being processed on the substrate.

The combination of Koizumi and Coronel et al. also do not teach claim 41 or the claims dependent therefrom because the references do not teach coupling energy across the wall to the gas in the chamber by powering the antenna, detecting optical radiation that propagates through the flat wall, and evaluating the detected optical radiation to monitor the depth of a layer being processed on the substrate.

The combination of Koizumi and Coronel et al. also do not teach claim 44 or the claims dependent therefrom because the references do not teach applying an RF signal to the cathode by powering the RF power source to produce electric fields within the chamber that interact with the gas to form a plasma in the chamber, detecting optical radiation that propagates through the wall, and evaluating the detected optical radiation to monitor the depth of a layer being processed on the substrate, as claimed.

For these reasons, the combination of Koizumi and Coronel et al. do not render obvious the present claims.

The above-discussed amendments are believed to place the present application in condition for allowance. Should the Examiner have any questions regarding the above remarks, the Examiner is requested to telephone Applicant's representative at the number listed below.

Respectfully submitted,

JANAH & ASSOCIATES
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